How Music Plays the Brain: *The Neuroscience of a Universal Human Obsession*

Spring 2016
Wednesdays, 7-8PM

Contact Information

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Course Description

Why do we love music? Why do certain songs get stuck in our head, or remind us of certain events in our life? ***What can music teach us about the human brain?***

This course examines the ways in which music has shaped the human brain and how it continues to shape the way we act, think, and create into the modern age. Students will discuss and critique the various ongoing topics of music cognition and neuroscience research that aim to delve into the biology of this universal human obsession.

In this course, students will examine music through the lens of neuroscience by studying how music affects and influences human behaviors, how music has influenced neuroscience research, and the neurobiology behind music perception. The class will be an approachable way for musicians and non-scientists to engage in scientific discussions and for scientists to think about human biology in an artistic way. Students will leave this course having developed a greater appreciation for the power of music through dialogues between an age-old art and a budding field of science.

Course Specific Objectives

1) Identify the musical features and patterns that elicit common neural and behavioral responses during music listening
2) Challenge common scientific myths related to assumptions about music and the brain (e.g., the “Mozart Effect,” right-brained vs. left-brained, etc.)
3) Critique music cognition and neuroscience research and describe the applications of this type of research
4) Formulate scientific questions related to music cognition and processing

Course Materials

1) All required texts will be provided through the Canvas/Class site (*This Is Your Brain On Music*, Daniel Levitin, 2006; various research journal articles)
2) Video assignments (mainly TEDtalks) will be available on Youtube and will also be provided through Canvas/Class site
3) Listening to music curated by YOU!

Assignments

1) **Video/Reading/Listening Responses (30%):** Students are expected to respond to the various video, reading, and listening assignments (comprised of TEDTalks, music from all genres, *This Is Your Brain On Music,* various journal articles) through an online discussion forum. These responses can be focused on main findings/points, questions about, and/or criticism of, the material and research studies. Responses should be roughly 100-200 words and will be used to guide class discussions. Responses will be due Monday nights and will be graded on completion. Submission of 10 responses required to receive full 30%. After that, 3% will be deducted for each missing submission.
2) **Short In-Class Group Quizzes/Feedback (20%):** *3 total.* (Dates: 1/25, 3/8, 4/5) Students will have short in-class quizzes after every unit to assess understanding of material learned in class. These quizzes will usually be matching and/or true-false. Students will be able to work in small groups to complete the assessment. Along with these quizzes, students will be required to complete feedback surveys for the instructor to assess teaching/course improvements as the semester progress.
3) **Final Paper (20%):** (Due 4/12) Students will write a short paper summarizing their experiences in the course, detailing what they have learned over the course of the semester, and addressing any questions they had or still may have about music cognition and processing. Guidelines: 2-3 pages double-spaced.
4) **(Fun!) Extra Credit (+2% each)**
    a) There will be opportunities to perform and share in class (musical performances, individual research projects, etc.) As this class is meant to increase cross-talk between science and music, I encourage all forms of information sharing!
    b) Participating in experiments @ the Yau Lab: My lab at Baylor is always looking for subjects to participate in various behavioral, TMS, and fMRI experiments. Unlike Experimetrix (required for Rice Psych courses), you will be compensated for your participation. Of course this is completely voluntary.
    c) I am a huge fan of the Houston Symphony. Throughout the semester, I will arrange a trip for those interested to Jones Hall together! Some highlights of this performance season: Tchaikovsky Symphony 6, Beethoven's Emperor Concerto, Rachmaninoff Piano Concerto 3, Don Juan, and many more.

Grade Policies

30% - Attendance and Active Participation in Discussion
30% - Weekly Responses
20% - In-Class Quizzes *(1/25, 3/8, 4/5)*
20% - Final Paper *(Due 4/12)*
Following Rice University standard grading system for Satisfactory/Unsatisfactory courses, a grade of 60% or above will be counted as Satisfactory (S).

Attendance Policy

Attendance is expected at each class. One optional trip to the neuroimaging facilities at the Baylor College of Medicine will be offered at a time TBA. Legitimate conflicts must be cleared with the instructor at least 24 hours in advance of class. Two unexcused absences are allowed, after that, -5% for each missed class.

Rice Honor Code

I expect academic integrity from all my students. All students will be held to the standards of the Rice Honor Code for all assignments. Details about the Honor Code can be found online in the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/.

Disability Support Services

Any student with a documented disability or condition affecting academic performance should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs. All discussions will remain confidential.

Syllabus Change Policy

This syllabus is only a guide for the course and is subject to change with advanced notice.

Course Schedule

Unit Overviews: This course is split into three units:

1) ***Unit 1 - Introduction:*** The first is an introductory unit going over the necessary music and science terms needed to understand the course material going forward. This unit will also prepare students to read scientific journal articles in an effective manner.
2) ***Unit 2 - How Music Plays The Brain:*** The second unit is a review of the research into the effects of music on the human brain. Topics in the unit will span from neurobiology to human cognition. We will end the unit by talking about applications of this research in music therapy.
3) ***Unit 3 - Into the Unknown:*** The third and final unit will discuss open-ended questions that are still hotly debated and yet to be solved in the field of music cognition. We will wrap up the course and bring it full circle by returning to the question of what music is, and how/if machine-generated music could change the way that we think and respond to music.

Date	Main Objectives/Highlights	Readings/Assignments
- Unit 1: Introduction -		
1/11/2017	What is Music? ● Introductions, syllabus, and class expectations ● Categorization games	TIYBOM: Intro NPR Article: Neuroscience of Musical Perception, Bass Guitars, and Drake
1/18/2017	When Music Met Neuroscience: Crash Course Pt. 1 ● Music CC: defining music terms (pitch, timbre, harmony, melody, repetition, inversion, polyphony, etc) ● Features of music	TIYBOM: Chapter 1 - What is Music?
1/25/2017	When Music Met Neuroscience: Crash Course Pt. 2 ● Neuroscience CC: Neuroanatomy, function, neuroscience methods, how to (critically) read a scientific journal article, etc. ● Debunking common music-neuroscience myths	TIYBOM: Chapter 3 - Behind the Curtain and Appendix A UNIT 1 QUIZ TODAY
2/1/2017	(OPTIONAL) Visit to Baylor Neuroimaging Facilities ● One lucky winner will get their brain scanned	**May be at different time than scheduled class time, date/time TBA
- Unit 2: How Music Plays The Human Brain -		
2/8/2017	Music Is My Drug: Music and Behavior ● Why are our favorite pieces are our favorite?	TIYBOM: Chapter 8 - My Favorite Things
2/15/2017	Moovin and Groovin: Rhythm ● Why does music make us want to dance? ● Neural correlates and scientific applications of rhythm and timing research	Reading: Grahn et. al. 2009 TIYBOM: Chapter 2 - Foot Tapping

2/21/2017	How We Hear: Auditory Research • How do we hear? • Basic auditory system • Neural correlates of sound segregation, auditory illusions	Listening: Diana Deutsch's Auditory Illusions Video: Nina Kraus Music and the Brain
2/22/2017	Songs that Bring Us Back: Music and Memory • Why do certain songs bring us back? • Musical memory research	TIYBOM: Chapter 5 - You Know My Name, Look Up the Number Reading: Janata et. al. 2009
3/1/2017	All the Emotions: Our • Why do get chills? Why (and how) does music make us feel? • Neurological basis of musical emotion	Reading: Salimpoor et. al. 2011 TIYBOM: Chapter 6 - After Dessert, Crick Was Still Four Seats Away From Me
3/8/2017	The Healing Power of Music: Music Therapy • How has music changed lives? • Applications of music-science research • Neurological Music Therapy	Video: Various Oliver Sacks' videos Reading: Thaut et. al. 2009 UNIT 2 QUIZ TODAY
3/15/2017	SPRING BREAK	*Have fun! Stay safe :)*
- Unit 3: Into the Unknown -		
3/22/2017	Music as Language (Guest Speaker: Dr. Tony Brandt, Shepherd School of Music) • Is music an innate cognitive function? Music as a language? • Looking at music cognition in babies	Reading: Brandt et al. 2012
3/29/2017	Musical Anomalies • How does musical expertise change the brain? • Is music a specialized cognitive function? • Case studies: Oliver Sacks' patients	TIYBOM: Chapter 7 - What Makes a Musician? Video: Oliver Sacks' patients
4/5/2017	Music Past, Present, and Future • How has music evolved throughout time? How are our modern technologies changing the way we think about music and creation? • The evolution of music, and music from an evolutionary perspective. • Era of AI technologies	TIYBOM: Chapter 9 - The Music Instinct Reading: Google's Magenta Project, David Cope - Experiments in Music Intelligence UNIT 3 QUIZ TODAY
4/12/2017	Performances/Presentations/Sharing	***FINAL PAPER DUE***
4/19/2017	Performances/Presentations/Sharing	***Good luck on finals!***